54
335

INFORMATION REPORT INFORMATION REPORT

CENTRAL INTELLIGENCE AGENCY

COUNTRY	USSR (Armenian SSR)	REPORT NO.	50X1
SUBJECT	Highways, Bridges, and Passes in Armenian SSR	DATE DISTR.	8 DEC 1955
		NO. OF PAGES	15
DATE OF INFO.		REQUIREMENT NO.	50X1
PLACE ACQUIRED		REFERENCES	
DATE ACQUIRED			50X1

SOURCE EVALUATIONS ARE DEFINITIVE. APPRAISAL OF CONTENT IS TENTATIVE.

50X1

Eylar (or Elar) (N 40-16, E 44-38)

50X1

Sukhoy Fontan: Available maps show the road passing through Fontan (N 40-24, E 44-42).

Akhta (N 40-30, E 44-46)

Sevan (N 40-33, E 44-56)

Golovino (N 40-43, E 44-51)

Semenovskiy Pass (N 40-41, E 44-51)

Dilizhan (N 40-45, E 44-52)

Idzhevan (N 40-53, E 45-11)

Uzuntala (N 40-59, E 45-15)

For Zenge river read Zanga River (N 40-33, E 44-58)

Novonikilaevka: Available maps show the road passing through Nikolayevka (N 40-21, E 44-39).

Page 3, paragraph 2:

Artashat (N 39-57, E 44-34)

Davalu (or Ararat) (N 39-50, E 44-42)

Arazdayan (N 43-38, E 44-46)

Nakhichevan (N 39-12, E 45-25)

Taza: Appears on available maps as Tazagyukh (N 40-06, E 44-28).

Gyukh: Ibid.

Echmiadzin (N 40-10, E 44-18)

Markara (N 40-02, E 44-11)

For Dzhafarabad read Dzhafarapat (N 40-03, E 43-56).

Khatunarkh: Available maps show a primary road passing to the left of Verkhniy Khatunark (N 40-06, E 44-20), through an urban area at (N 40-06, E 44-17).

Ashtarak (N 40-18, E 44-22)

Talish (N 40-17, E 44-05)

Talin: Available maps show a primary road between Talish and Mastara, passing through Verkhniy Talin (N 40-23, E 43-53). Nizhniy Talin (N 40-20, E 43-51) lies southwest of Verkhniy Talin, on the Karaburun road.

Mastara (N 40-27, E 43-53)

Maralik (N 40-34, E 43-52)

Page 4, paragraph 5:

Kasakh River (N 40-18, E 44-22)

Karaburun (N 40-15, E 43-49)

Kirovakan (N 40-48, E 44-30)

Amzagiman appears on the attached map as Amzachiman.

Page 5, paragraph 8:

[redacted]skiy Pass (N 40-45, E 43-58).

Bol'shiye Keti: Available maps show the primary road between Leninakan and Kalinino, passing through Nizhniye Keti (N 40-53, E 43-51).

Vardagbyur (N 40-58, E 43-54)

Kalinino (N 41-07, E 44-18)

For Krestovskiy Pass read Krestovyy Pass (N 42-32, E 44-28).

Page 6, paragraph 10:

Stepanavan (N 41-01, E 44-23)

For Pushinskiy Pass read Pushkinskiy Pass (N 40-54, E 44-26).

For Gerger River read Gergeri River (N 40-57, E 44-26).

For Tumanyan (Kolageran) read Kolagiran (N 40-58, E 44-42).

50X1

Pambak River (N 40-57, E 44-39)

Page 7, paragraph 13:

Goris (N 39-30, E 46-23)

For Angekhaket read Angekhakot (N 39-35, E 45-55).

For Bichanagskiy Pass read Bichenakskiy Pass (N 39-33, E 45-48).

For Sisyan read Sisian (N 39-32, E 46-02)

Kafan (N 39-12, E 46-22)

For Minkzhvan read Mindzhevan (N 39-02, E 46-42).

Page 8, paragraph 2:

Norashen, (N 39-33, E 45-02)

Bazarchay (N 39-35, E 45-45)

For Shaabyz read Shakhbuz (N 39-25, E 45-32)

Dastakert (N 39-23, E 46-02)

3. The following are coordinates and corrected spellings of locations mentioned [redacted] Attachment:

50X1

For Karaklis read Karakilisa (N 40-43, E 43-49).

For Nizhne Agdzhakshala read Nizhne-Agdzhakala (N 40-20, E 44-01).

For Ranchpar read Ranchar (N 40-02, E 44-22).

For Saranyar read Sarvanlar (N 40-03, E 44-24).

For Sadunchi read Sabunchi (N 39-59, E 44-28).

For Agamzaly read Agamzalu (N 40-03, E 44-28).

For Fiopetovo read Fipletovo (N 40-44, E 44-42).

[redacted] Comments

50X1

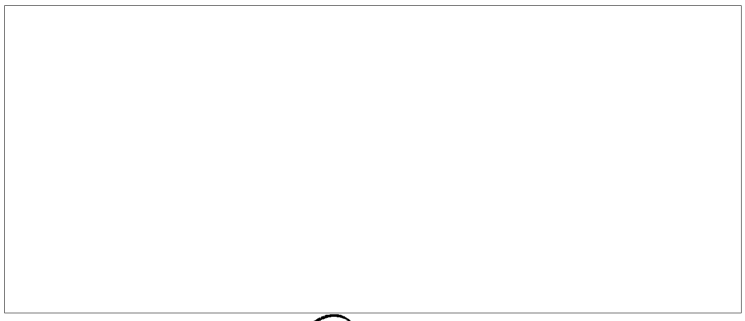
1. Ref. page 9, paragraph 2, visevka should probably read vysevki.

2. Ref. Attachment, Karaklis is the same as Kirovakan (N 40-48, E 44-30).

C-O-N-F-I-D-E-N-T-I-A-L

C-O-N-F-I-D-E-N-T-I-A-L

50X1



+1

C-O-N-F-I-D-E-N-T-I-A-L

CONFIDENTIAL

REPORT NO. [redacted] 50X1

50X1

COUNTRY USSR (Armenian SSR)

DATE DISTR. 26 Oct 1955

SUBJECT Highways, Bridges, and Passes in Armenian SSR

NO. OF PAGES 11

DATE OF INFORMATION [redacted]

REFERENCES:

PLACE ACQUIRED [redacted] 50X1

THIS IS UNEVALUATED INFORMATION 50X1

[redacted]

Introduction

This report describes the main highways and roads of the Armenian SSR. [redacted] 50X1

[redacted] 50X1

50X1

50X1

A. Individual Highways, Bridges and Passes

1. The Yerevan - Eylar - Sukhoy Fontan - Akhta - Sevan - Golovino - Semenovskiy Pass - Dilizhan - Idzhevan - Uzuntala Highway

The Yerevan - Uzuntala road is the principal highway of the Armenian Republic and consists of approximately 180 km of black-top, blend type road surface having as a foundation the former white construction rock roadbed. It joins the Azerbaydzhan SSR road net at Uzuntala and leads to the Georgian Border Road. The traveled way is eight to ten meters wide, but on steep turns the road widens to 12 to 14 m and in the villages it narrows to six or seven meters. Except for one 35 to 40 m long, old bridge across the Zenge river, there are no large road bridges along its route. However, there are many small bridges 10 to 13 m long and many culverts. The worn down portions and holes of the road are repaired each year, and some portions are resurfaced with a single or double surface.

From 1946 to 1948 an impregnated surface by-pass, approximately five kilometers long and eight meters wide, was constructed near Akhta. In 1950 construction began on a six-kilometer long, eight meter wide by-pass near Dilizhan which was scheduled for completion in 1953.

a. Semenovskiy Pass

The by-pass here has a black-top surface built by means of impregnation. Its width is eight to ten meters. Along sharp curves, however, the width of the road reaches 12 to 14 m. There are breast-walls (constructed in 1952) to retain the ground in case of landslides caused by rain. Traffic moves normally all year round. From the center of the pass toward Dilishan, there are large forests.

b. Snow Conditions

This road is snow-bound from the village of Novonikilayevka, located approximately 30 km from Yerevan, to the Semenovskiy Pass, including two curves of that portion of the road which leads through the pass. The remainder of the road to the Georgian Border is not snow-bound, because of the presence of forests and the nature of the terrain. Snow drifts on the above-mentioned portions of the road usually start in December and last until March, depending on the severeness of the winter. Along the road snow-screens are set up to hold back the snow. Besides this the snow is cleared from the road by both mechanical means (tractors, snow ploughs) and by manual labor. Occasionally certain portions of the road are closed as a result of continuous snow-storms, which may last from one week to 10 days. Generally speaking, this road is always open to vehicular traffic.

c. Bridges

The bridge across the Zanga River on the Yerevan - Dilishan road at the outskirts of the regional center, Sevan, has a length of about 35 to 50 m. Its width is about six meters. The bridge supports are of stone. The superstructure is wooden. The nature of the road bearer construction and the weight capacity are unknown.

50X1

2. Yerevan - Artashat - Davalu - Arazdayan - Nakhichevan - Azerbaydzhan Border Highway

The length of the highway is about 70 km, the width of the traveled way is generally six meters, and in rare instances up to eight meters. It has a black-top impregnated surface. There are no large bridges along its route, but there are small bridges and culverts not longer than eight to ten meters. These bridges are of stone and the culverts are of concrete. In 1951 a two kilometer by-pass was constructed near the village of Akhamzal. This by-pass is eight meters wide and of the impregnated type. Holes are repaired annually by the single- or double-surfacing process. Such repairs took place in 1947 - 1948 near Arazdayan and in 1950 - 1952 near Davalu - Artashat, and also in the Taza - Gyukh - Yereven portion. (These were large scale repairs.) This road is not snow-bound and is not subject to winter maintenance in view of terrain conditions.

3. The Yerevan - Echmiadzin - Markara Turkish Border Highway

This highway is about 50 to 60 km in length. The width of the traveled way is generally six meters and in some places up to eight meters. For seven kilometers from Yerevan to Dzhafarabad it has an asphalt-reinforced surface over a former white-construction-rock roadbed. In 1951 a one kilometer portion of the road near the Agyr - Gel lake region was leveled and a concrete-reinforced, 10 m long bridge constructed. Along the remainder of the route are small bridges and culverts, constructed long ago. Chuck hole repairs are accomplished annually. In 1948-1952 the route was subjected to a single- and double-surfacing repair job for a 32 to 35 km stretch. This road is not snow-bound and is not subject to winter maintenance.

The bridge near the Lake Agir - Gel on the Yerevan-Echmiadzin-Markara Road is constructed of reinforced concrete. The bridge supports are of stone. The length of the bridge is 10 to 12 m, its width six to seven meters. Its weight capacity is 60 tons.

4. Echmiadzin - Khatunarkh Turkish Border Road

The length of this highway is no more than 35 km (source personally was never on this road). Its assumed width is mostly six meters but in places it is wider. For 20 km from Echmiadzin the surface is of the black-top "blend" type. The remainder of the road to the Turkish border is of gravel. This road was very slowly constructed from 1946 to 1952 at a rate of 3 to 3½ km annually. This road is not snow-bound and is not subject to winter maintenance.

5. Yerevan - Echmiadzin - Ashtarak - Talish - Talin - Mastara - Maralik - Leninakhan Fork of Road

This route is about 150 km long. The width of the traveled way is six to eight meters. From Yerevan to Talin (about 100 km) the route is of the black-top "blend" type. From Leninakhan to Maralik (10 to 15 km) it was a white road metal surface. The remainder of the route is a dirt road with a badly-damaged surface (1952). It was planned to construct in 1953 a 25 to 30 km length of black-top "blend" type surface, with construction starting at the same time from both Talin and Leninakhan, and then to complete the remaining portion in 1954. From 1946 to 1952 a 35 to 38 km length of black-top was laid from Talish to Talin at the rate of five to six kilometers annually. In 1951-1952 a concrete-reinforced bridge 16 to 18 m long and 8 meters wide was constructed in the Aynalu ravine. During the same time two other concrete-reinforced bridges 14 m long were constructed along the route between the Aynalu ravine and Talin.

Damaged portions of the route are repaired annually, as needed, by repairing the chuck-holes by resurfacing. In 1950 survey work was done in the

50X1

Ashtarak region 1½ to 2 km below the present one-way stone bridge across the Kasakh River, in an effort to find a new site for a large concrete-reinforced bridge. The bridge is expected to be about 140 to 160 m long and 6 m wide. The traveled way of the bridge is expected to be 70 m over the surface of the river. In 1951 - 1952 work was already started on the shore and center caissons as well as on the approaches. 50X1

how far construction of this bridge had progressed by 1954 but thought it highly possible that it was then in use or was 50X1

a. Snow and Snow Removal 50X1

This road is not open during the winter. It is closed until late spring (from Talin) because of the heavy snow and snow-drifts. The portion of the road stretching approximately from the village of Talish to almost Leninakhan is snow-bound because of the nature of the terrain. Approximately from the middle of December to the end of March, vehicular traffic on this portion of the road is interrupted and the road closed. This portion of the road is not subject to winter maintenance, and the snow is not cleared off.

b. Bridge Across Kasakh River

This bridge, near the regional center of Ashtarak, is constructed of reinforced-concrete with three spans. The length of the bridge is 140 to 160 m, its width six meters. The bridge supports are also of reinforced-concrete, of a basalt type. Its weight capacity is not less than 60 tons.

c. Three Bridges

There are three bridges on the Ashtarak - Talin Highway. Their lengths are from 14 to 18 m and the width of their traveled ways 6 m. Their construction is of reinforced-concrete. The bridge supports are of stone and the weight capacity not less than 60 tons.

6. Talin - Karaburun Railroad Station Roadway

This road is about 22 to 25 km long and six to seven meters wide. In 1952 it was a badly damaged white road-metal surface road. Chuck hole repairs and sanding are done annually. It has no large bridges. Because of snow the road is almost continuously closed from the middle of December to the beginning of March. This road is not subject to snow-clearing and winter maintenance for the benefit of vehicular traffic. The regional center of Talin and the railroad station of Karaburun are constantly linked by cart transport and occasionally, if weather permits it, by automobile transport.

7. Kirovakan - Amzagiman - Dilishan Road

This road is 50 km long. The traveled way is about six meters wide in most places but occasionally goes up to eight meters in width. The surfacing is as follows. From Kirovakan for 13 km, it is asphalt-reinforced. From this point to Amzagiman it is of a black-top "impregnated" type. From Amzagiman to Dilishan the route has a white road-metal surface. The asphalt-reinforced portion was constructed in 1950 - 1951, from six to seven kilometers annually, while the 12 km stretch of black-top to Amzagiman was built in 1952. In 1951-1952 the road was widened and stone bulwarks constructed at curves from Amzagiman to Dilishan. In 1952 the former small bridges were widened along the 13 km asphalt-reinforced portion. Generally speaking the road does not become snow-bound except for isolated portions for short

50X1

periods when heavy snow storms occur. In general, however, there are no snow-drifts in view of the presence of large forests and because of the local terrain. Isolated snow-bound portions of the road are cleared by hand and occasionally by mechanical means. During the winter this road generally remains open to automobile transport. Snow clearing on this road starts in December and lasts approximately until the middle of March.

An Armenian Ushosdor plan for 1953-1954 had projected surfacing the remainder of the route with an impregnated surface.

8. Kirovakan - Dzhadzhurskiy Pass - Leninakhan Road

This route is about 70 km long and the traveled way is about six to eight meters wide. It has impregnated-type, black-top portions from Kirovakan to the Dzhadzhurskiy Pass. Other portions are of the double "blend" type. From the pass to Leninakhan the route has a white construction rock surface. In 1949-1950 the 10 to 12 km stretch from Leninakhan to the pass was surfaced with road metal. In 1951-1952 the completely worn portions of the black-top were completely resurfaced by the "blend" type method. Construction was 3½ to 4 km annually as far as could be recalled 50X1
Chuck hole repairs are made rather systematically. There are no large bridges along the route. Former small bridges and culverts are being reconstructed and widened. The road is subjected to heavy snow falls and is snow-bound, especially at the Dzhadzhurskiy Pass.

a. Snow and Snow Removal

On some portions of the road there are heavy snow drifts, which are cleared by tractor-drawn snow ploughs and by hand. Snow clearing on this road usually starts at the beginning of December and continues until the end of March. Occasionally, in view of incessant snow-storms, certain portions of the road, especially in the pass area, are cleared for 10 to 15 days. Along heavily snow-bound portions, snow-screens are set up to hold back the snow.

b. Dzhadzhurskiy Pass

This is a white road-metal highway. The width of the traveled way is about six to eight meters. Along curves the width of the road reaches 10 m. During the winter automobile traffic is difficult due to heavy snow-drifts. During the remainder of the year automobile traffic proceeds at moderate speed. This is the coldest part of Armenia.

9. Leninakan - Bol'shiye Keti - Vardagbyur - Kalinino Road

This route is about 75 km long and the traveled way is six to seven meters wide. A five kilometer stretch from Leninakhan was surfaced with a asphalt-reinforced surface in 1950-1951. The road for 50 to 52 km from this point has a white, road-metal surface, while the remainder of the route is a dirt road up to a point 15 km from Kalinino. The last 15 km are of the white, road-metal type. A white, road-metal surface was planned for the dirt portion in 1953. The former white, road-metal surface was laid in 1950-1952, at the rate of 16 to 18 km annually.

There are no large bridges along the route. The small bridges and culverts were being systematically reconstructed and widened. This road becomes heavily snow bound and the 40 km stretch from Leninakan to the regional center of Kalinino is usually heavily snow-bound, especially near the Krestovskiy Pass. This road is not subjected to winter maintenance and remains closed from the middle of December to the end of March. The portion of the road in the pass region is often closed until the middle of April. There was no mechanical snow removal.

50X1

10. Stepanavan - Pushinskiy Pass Road and the Kirovakan - Leninakan Road Fork

The length of this route is 45 to 50 km and the width of the traveled way is six to eight meters. The surface from Stepanavan for six kilometers is black-top and was constructed from 1950 to 1951 by double surfacing over a white highway at an annual rate of three kilometers. The remainder of the road is of the white, road-metal surface type, although the portion of the road leading over the pass is partly of the dirt road and gravel type. From 1948 to 1952 badly-worn portions of the road were replaced by white highway constructed at an annual rate of five to six kilometers.

Across the Gerger River there is a 35 to 40 m long bridge. The bridge support is of stone but the superstructure is wooden. In 1953-1954 the bridge was supposed to widened and rebuilt. There are small bridges and culverts up to six to eight meters long. The road is subject to being snow bound, especially in the Pushinskiy Pass region. Winter maintenance and snow clearing by mechanical and manual means are performed from the beginning of December to the middle of March (middle of March in the pass region). During heavy snow-storms the road, especially in the pass region, remains closed for 7 to 10 days. Generally speaking, every effort is made to keep the road open to automobile transport.

a. Pushinskiy Pass

This is a white, road metal highway with occasional sections of dirt road. The width of the traveled way is six meters, but along sharp curves it reaches 8 to 10 m. Automobile transport and traffic proceeds at moderate speed. Heavy snow drifts make automobile traffic difficult during the winter.

b. Bridge Across Gerger River

This bridge crosses the Gerger river on the Stepanavan - Kirovakan Highway, has a length of about 35 to 40 m, a width of six meters. The bridge supports are of stone, the superstructure of wood. The weight capacity of this bridge is unknown.

11. Road from the Tumanyan (Kolageran) Railroad Station to the Stepanavan - Pushinskiy Pass

The length of the route is about 35 km, while the width of the traveled way is from six to eight meters. It has a white, road metal surface. Heavily worn portions were repaired in 1950-1952 at the rate of six to eight kilometers annually. Chuck-holes are repaired systematically. In 1950-1951 a steel bridge (girders were made in Kiev) was constructed at Tumanyan across the Devbet River. The width of the traveled way of the bridge is six meters and the length 60 m. It is 10 m above the river surface. The remaining bridges and culverts are small, not over eight meters long. The road does not become snow-bound and is not subject to winter maintenance. Occasionally, in the event that there are heavy snowfalls, the road is cleared manually.

a. Bridge Across Pambak River

This bridge crosses the Pambak river on the Stepanavan - Tumanyan (Kolageran) Railroad Station Highway, has a length of about 60 m. Its width is six meters. The bridge supports are of stone and the weight capacity not less than 60 tons. The girders are of metal and the superstructure of reinforced-concrete.

12. Stepanavan - Kalinino - Georgian Border Road

The length of the route is about 45 km, while the width of the traveled way is six to eight meters. The surface is of white road metal which was

laid in 1948 - 1951 and really consisted of repairing the former road surface. From that time there have been systematic repairs of chuck holes. There are no large bridges along the route. The present small bridges and culverts were reconstructed in 1951-1952. The road from the regional center of Kalinino to the Georgian border becomes snow-bound and is not subjected to snow clearing. This portion of the road is therefore often closed to automobile traffic from early December to the end of March.

13. Goris - Angekhaket - Bichanagskiy Pass (through which pass the Armenian and Azerbaydzhan border roads)

The length ofthis route is about 70 km, the width of the traveled way about six to eight meters. Seventy percent of the route has a white, road-metal surface, while the remaining 30 percent near the pass has a dirt surface. Each year the road is widened and repaired. It was planned to lay a white, road-metal surface in the pass area in 1953-1954. The present white, road-metal surface was laid in 1946-1952 at an average of seven to eight kilometers annually. The river at the base of the pass is crossed by a 25 to 30 m long bridge, having a traveled way six meters wide. The name of the river as well as the type of bridge are unknown. The remainder of the bridges along the route are no longer than six to eight meters. The road is heavily snow blocked, especially in the pass area. From the middle of November to April the road is kept clean and maintained by both mechanical and manual means. As a result of heavy and continuous snow-storms the pass section of the road is often closed for 10 to 15 days.

a. Bichanagskiy Pass

This is a dirt road. Occasionally there are gravel portions. The width of the road is six to seven meters, but along sharp curves the width reaches 10 m. During the period of heavy rainfalls, ruts are formed which render automobile transport difficult. During the winter automobile traffic is extremely difficult due to heavy snow drifts. During the remainder of the year automobile traffic proceeds at moderate speed. Generally speaking the pass is in poor condition for automobile traffic.

b. Bridge near Anchekhakot

The bridge on the Goris - Bichanagskiy Pass Highway is located not far from the village of Anchekhakot. The length of this bridge is about 35 to 40 m, its width six meters. Bridge supports are possibly of stone, and the upperstructure of wood. The weight capacity is unknown.

14. Goris - Azerbaydzhan Border Road

The length of the route is about 30 to 35 km; the width of the traveled way is in most spots six meters but wider in others. The surface is of white road metal, which was subjected to a basic repair and reconstruction job in 1949-1952. From that time on it was subjected to systematic chuck-hole repairs. There are no large bridges along the route. In 1952 road curves were widened. The route is not snow-bound and is not subjected to snow clearing.

B. Road Net of Yerevan and Zangezyrom

The city of Yerevan is linked with Zangezyrom (Goris, Sisyan and Kafan regions) by three basic means of communications

1. Road over Kafan

It is necessary to go by the Yerevan-Baku Railway to the Minkzhvan Station, andfrom there by train to the city of Kafan, andfrom Kafan by the Kafan-

Goris-Sisyan Highway. A portion of this road, especially between Kafan and Goris, only infrequently is snow bound and is used during practically the entire year. The route is about 60 km long. The relief of the area makes this route difficult to travel.

2. Road over Kazbek

The second link is the Yerevan - Artashat - Norashen - Kazbek - Malichea - Bazarchay - Anchekhakot - Goris Highway. The route from Norashen to Goris is of the white, road-metal type, but black-top from Yerevan to Norashen. The relief is rugged. There are several pass areas that are closed during the winter. Vehicular traffic ceased from the end of November to the end of April, because there is no winter maintenance.

3. Road over Nakhichevan.

The third link is the Yerevan - Artashat - Norashen - Nakhichevan - Shaabyz - Bichanagskiy Pass - Angekhakot - Goris Highway. This is of the black-top type from Nakhichevan to Goris, for the most part, of the white, road-metal type. There are also short stretches of gravel or dirt roads. The general relief of the roadway, except for the Bichanagskiy Pass, is of a less rugged nature. The pass used to be closed from the end of November to the end of March because of heavy snow-falls and drifts. The road is subject to winter maintenance as well as both mechanical and hand snow removal operations. It must be taken into account that this road is the main roadway between Yerevan and Goris.

4. Bichanagskiy Pass Improvements

Starting in 1949 the Soviet government began to pay particular attention to the condition of the Bichanagskiy Pass. In the summer of 1949 the side bulwarks of the pass were strenghtened and in some spots also widened. The Armenian Ushosdor received orders to keep the pass free of snow drifts. From that time snow removal was accomplished with the aid of snowplow and bulldozers. According to rumors floating around, the reason for the sudden attention to the pass was linked to the rumored discovery of uranium ore in the Sisyan (Armenia) region. There were no facts to indicate the veracity of these rumors, and they are therefore related strictly as hear-say statements. However, it is known specifically that since 1945 mines have been constructed near Dastakert, the Sisyan region for the mining of molybdenum (metal used to produce high quality steel). This construction was highly successful and the yield has progressed year by year. It seems that the construction of an airfield in the Sisyan region has much in common with these operations.

C. Methods of Highway Construction (source described Soviet road-making processes as follows):

1. Asphalt and Concrete

The subgrade with appropriate road profile and ouvettes (drainage) is initially laid. The subgrade is subjected to heavy rolling by 10 to 12 ton rollers. The rolling is followed by laying a 10 to 12 cm layer of sand and then an 8 to 12 cm layer of cobblestone or coarse, hard rock, which in turn is heavy rolled. On top of this rock layer a four-centimer filler layer of road-metal is added and the heavy rolling is repeated. Now begins the construction of the five to seven centimeter bottom layer of asphaltic concrete, which is steam-rolled by 10 to 12 ton rollers. The top layer of asphaltic concrete is very fine and three to four centimeters thick. It is laid and rolled by five to eight ton rollers, preferably double ones. This is followed by a very thin layer (up to .2 cm) of sand, and the subgrade is ready for use.

If this asphaltic concrete surfacing is applied to old roads which have a hard subgrade, the surface is first leveled, carefully cleaned of obstructing dust and debris by mechanical rotary brushes, and then the asphalt reinforced surfacing is applied as described above.

2. Impregnation

The subgrade and the road bed are prepared in the same manner as above. Following this a 10 to 12 cm layer of very coarse road-metal is laid and subjected to heavy rolling by heavy rollers. Asphalt (grade two or three) heated to 140 - 160 degrees centigrade in rotating mixer-carriers is poured over the entire traveled way of the road. After the asphalt soaks into the coarse road-metal layer, another six to eight centimeter layer of fine road-metal is added and subjected to heavy rolling. Following this portion of the construction a second layer of hot asphalt, of the same temperature, is poured. After this soaks into the surface a four centimeter layer of very fine road-metal (visevka) is added and rolled by light-weight five to eight ton rollers. A third coating of asphalt is poured, and then covered by a 1½ to 2 cm layer of sand (preferably coarse-grained sand). A final rolling of the surface, by means of light rollers, completes the process, and the road is ready for use. This type of road belongs to the "black-top" variety.

During the summer this type of road requires systematic care since the asphalt tends to "sweat" that is, it rises to the surface of the road. In these instances it is necessary to sand them in time. From the standpoint of durability and solidity, this type of road is second to the asphaltic-concrete type in the "black-top" class.

3. Blending

The subgrade and the roadbed are prepared in the same manner as the asphalt-concrete type. The hard roadbed is covered with gravel so that it forms a 10 to 12 cm layer when mixed together with the asphalt. Gravel is unloaded along the entire length of the road. A pit is made in the gravel piles into which liquid asphalt is to be poured. Carriers truck in the cold, liquid asphalt and pour it into the pit all along the latter's length. The gravel and asphalt are mixed by means of towed graders until a finished mass is produced. The graders then push this onto the surface of the traveled way of the road. This layer is rolled by heavy rollers and the road is ready for use. This type of construction is also of the "black-top" class. It is not as durable, and it is damaged in a comparatively short time when subjected to intense vehicular traffic.

4. Double Surfacing Process

This type of road covering is applied only to impregnated or asphaltic-concrete type black-tops. On heavily worn portions of these types of roads a four to six centimeter layer of fine road-metal rock is strewn, rolled with heavy rollers, and covered with hot asphalt (grade two or three) at a temperature of 140 to 160 C. The hot asphalt then soaks into the road-metal. This surface is then covered with a three to four centimeter layer of much finer road-metal and rolled by light rollers. On top of this rolled surface, asphalt of the same type and temperature as above is poured. As soon as it soaks into the road-metal it is covered with a 1½ to 2 cm sand layer and rolled by light rollers. A road repaired by this method requires close care for the first two years, especially in the summer when the hot sun cuases it to "sweat".

5. Single-Surfacing Process

This type of road covering is applied to black-top roads with the exception of those constructed by the "blending" method. The degree of wear and tear

50X1

on a reconditioned road must not be too great. The worn portion of the road is covered by a four to five centimeter layer of road-metal, which is rolled by light rollers and then covered by asphalt (grade 2 or 3), heated to 140 to 160 degrees centigrade. After impregnation by the asphalt, the surface is covered by a 1½ to 2 cm layer of sand and again rolled by means of light rollers. This type of road also requires timely care with the arrival of the summer heat.

6. White Road-Metal Highways

The subgrade and the roadbed are prepared in the same manner as in the previous cases. The roadbed is then covered with a 12 to 16 cm layer of coarse road-metal and heavy rolled. After the first rolling a three to four centimeter layer of very fine road-metal is added to the surface. The rolling is repeated with a simultaneous soaking by water. The last step of this construction consists of adding a 1½ to 2 cm layer of coarse sand, followed by a light rolling.

7. Cobblestone Roads

A 14 to 16 cm layer of sand is added to a finished roadbed. The cobblestone surface is then put down by hammering individual cobblestones into place. A filler layer of 1½ to 2 cm of sand is added after the laying of the cobblestones and then heavy rolled. A 2 to 2½ cm layer of coarse sand is added and subjected to a final heavy rolling. In recent years this obsolete type of road construction in the USSR has not been used.

8. Dirt Roads

After construction of the subgrade and road profile, the surface is heavy rolled. Uneven spots are then filled in with dirt and the rolling is repeated. As a rule dirt roads are used only during the dry summer periods since atmospheric precipitations makes them quickly rutted and unusable in other seasons. These roads can only be considered as temporary ones and are unsuitable for year-round vehicular traffic.

There are no roads with concrete sub-bases in Armenia. It is believed that their construction is too expensive. The construction principles of such roads are unknown (to source). At the present time concrete roads, which constitute the best and most lasting type, are not being built.

9. Proportions of Highway Types

[redacted] the appropriate percentages of the various types of surface for those Armenian roads which were maintained by the Directorate of Main Highways of Armenia were as follows: 50X1

Asphalt-concrete roads:	3.5%
Black-top roads:	57.5%
White, road-metal highways:	30.0%
Dirt roads:	9.0%

D. Miscellaneous Highway Information

1. Significance of By-Passes

By-passes along existing automobile highways are built for the following reasons:

50X1

On road sections where there are landslides along steep hills, causing a constant destruction of the roadbed, by-passes offer a substitute road profile less dangerous to traffic. Landslides increase in proportion to the amount of freight traffic and traffic intensity. In such cases by-passes are built to lessen the intensity of automobile transport and as much as possible to reduce landslides.

Along portions of highways where there are centers of population with narrow streets impeding the normal flow of automobile traffic, by-passes are built around such populated places. This insures a normal and constant flow of traffic.

In spots where there are sharp curves along the highway exposing cars to the danger of overturning and forcing them to reduce their speed, by-passes are built to counteract such dangers and avoid automobile accidents.

In general the purpose of building by-passes is to insure normal, fast and safe automobile transport along the roads.

1. Comment: the organization and equipment of the Highway Directorate. 50X1 50X1

2. Comment: Highways and roads not serviced by Ushosdor were not known and, therefore, not included. 50X1 50X1

Annexes:

Annex A - Sketch of the Highways of Armenia Serviced by Ushosdor. 2. 50X1